RE: APCD Comments on the Eastern Colorado Draft Resource Management Plan/Draft Environmental Impact Statement (DRMP/EIS) for the Bureau of Land Management Colorado Royal Gorge Field Office (BLM-CRGFO).

Air Quality Related Comments on the DRMP/EIS

The comments below are specifically regarding the emissions inventories provided by BLM to CDPHE on February 27, 2018 used in the DRMP/EIS:

The growth in oil and gas activity and resulting emissions presented in the RMP and CARMMS documents and spreadsheets are much higher than those used in the Colorado Ozone State Implementation Plan (SIP), which was submitted to EPA last year. RMP Area 1 is the same as Colorado's Denver Metropolitan Ozone Nonattainment Area (NAA). The base year RMP Area 1 2015 Inventory is compared to the CDPHE submitted EPA's National Emissions Inventory (NEI) Version 2, 2014 Inventory, in Table 1. While overall VOC emissions agree fairly well, condensate tank emissions are more than twice as high in the NEI than in the RMP inventory, pneumatic device emissions are less than half as high in the NEI than in the RMP inventory, and fugitive emissions are far higher in the NEI than in the RMP inventory. Overall NOx emissions in the NEI are about 60% of the total NOx in the RMP inventory, and pneumatic device emissions are less than half as high in the NEI than in the RMP inventory due to lower oil burner and compressor engine emissions in the NEI.

Table 1: EPA/CDPHE NEI Version 2 2014 Inventory Comparison to RMP Area 1 2015 Inventory

Non-Point 2014NEIv2 NAA counties	NOx (tpd)	VOC (tpd)		RMP Area 1 (Ozone NAA) 2015	NOx (tpd)	VOC (tpd)
Drill Rigs	13.48	1.24		Drilling Equipment	4.24	0.24
Fugitives: All Processes		23.87		Equipment Leaks	0.00	3.39
Gas Well Heaters	8.29	2.87		Heaters	22.53	1.24
Gas Well Pneumatic Devices		34.67		Pneumatic Devices	0.00	92.19
Gas Well Pneumatic Pumps		0.36		Completion and Recompletion Venting	0.00	6.23
Gas Well Truck Loading	0.01	10.69		Truck Loading	0.00	17.16
Gas Well Venting - Blowdowns		6.05		Well Blowdowns	0.00	19.15
Gas Well Venting - Initial Completions	0.03	0.39		Completion Flaring	0.04	0.05
Hydraulic Fracturing Engines	11.09	0.78		Completion Equipment	7.28	0.42
Miscellaneous Engines	8.98	1.67		Misc. Engines	0.56	0.03
Produced Water	0.02	5.83		Completion Traffic	0.01	0.01
Storage Tanks: Condensate	0.63	104.50		Condensate Tanks	0.00	44.46
Total: All Processes		0.42		Condensate Tank Flaring	0.17	0.22
Wellhead Separator		8.77		Tanks	0.00	3.37

Emissions					
Wellpad Total	42.54	202.14	Refracing Equipment	1.11	0.06
Point 2014NEIv2 NAA counties	NOx (tpd)	VOC (tpd)	Workover Equipment	2.94	0.17
External Combustion Boilers	0.11	0.00	Construction Equipment and Traffic	0.77	0.06
Internal Combustion Engines	12.68	3.93	Wellhead and Lateral Compressor Engines	51.94	36.36
Industrial Processes	0.57	3.78			
Petroleum and Solvent Evaporation	0.00	1.09			
Waste Disposal		0.07			
Midstream Total	13.36	8.87			
TOTAL	55.90	211.01	TOTAL	91.60	224.80

Table 2 shows a comparison of existing activity and projections in RMP Area 1. The actual base year oil/condensate production is about 77% of the RMP estimate. In 2017, oil/condensate production is less than one third of the RMP estimate and gas production is less than three quarters of the RMP estimate.

Table 2: Existing Activity and Projections (RMP Area 1/Ozone NAA)

COGCC Production DATA RMP 1 Area
(Ozone Nonattainment Area)

Year	NAA oil production	NAA gas production	Spuds
2011	18,047,826	217,154,759	1580
2012	24,298,228	243,431,181	1404
2013	35,142,059	275,013,513	1143
2014	53,705,629	344,067,273	1342
2015	72,061,363	482,048,823	974
2016	68,199,430	558,482,361	604
2017	77,291,382	586,992,791	1249

RGFO_high_Conv_1_ECRMP_Emissions_2-16-2018.xlsm

Year	annual condensate production CY Activity, Non-BLM	annual gas production CY Activity, Non-BLM	spuds spuds
2015	93,288,973	527,672,716	906
2016	137,800,014	628,169,171	1532
2017	211,128,437	804,472,639	1532
2018	247,319,547	900,775,343	1532
2019	265,940,900	957,456,577	1532
2020	279,574,784	997,028,800	1532
2021	290,163,056	1,025,871,957	1532
2022	298,887,680	1,048,507,228	1532
2023	306,328,187	1,066,951,541	1532

2024	312,834,617	1,082,413,831	1532
2025	318,633,378	1,095,670,082	1532

Table 3 shows a comparison of existing activity and projections in RMP Area 3. The actual base year oil/condensate production is about a factor of three higher than the RMP estimate; gas production is more than twice as high; and spuds are a factor of 1.4 times higher. In 2017, oil/condensate production is less than one third of the RMP estimate and gas production is only slightly less than one third of the RMP estimate. Spuds (new wells) are about 87% of the RMP estimate in 2017, because most of the development is occurring in Weld County above the NAA boundary.

Table 3: Existing Activity and Projections (RMP Area 3)

COGCC Production DATA RMP 3 rea

Year	oil	gas	Spuds
2011	12,536,816	86,003,612	389
2012	16,144,683	85,613,334	186
2013	22,855,994	86,291,017	244
2014	33,633,125	96,956,188	339
2015	43,266,911	117,381,092	148
2016	41,068,512	126,336,792	151
2017	46,068,761	127,486,448	106

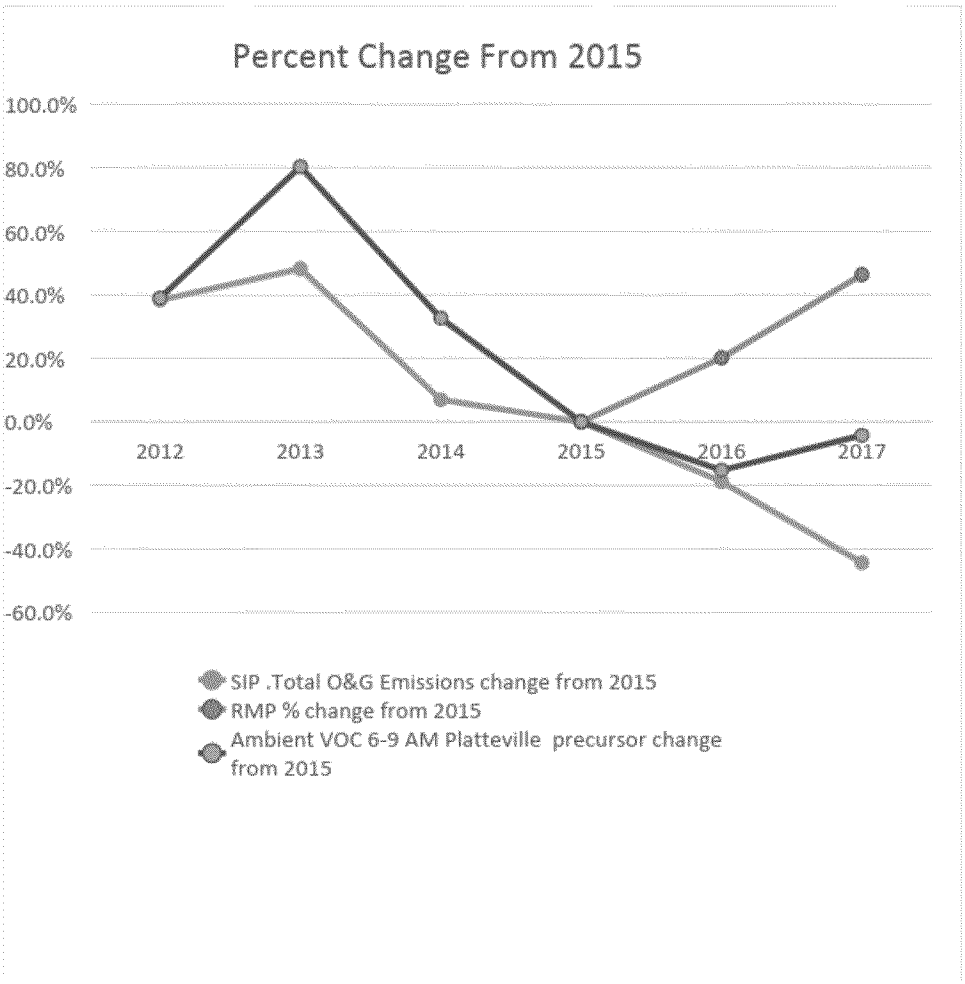
RGFO_high_Conv_3_ECRMP_Emissions_2-16-2018.xlsm

Year	annual condensate production CY Activity, Non-BLM	annual gas production CY Activity, Non-BLM	spuds CY Activity, Non-BLM
2015	14,419,618	49,815,827	179
2016	64,416,213	172,450,587	1532
2017	142,549,495	368,614,691	1532
2018	182,982,246	482,849,107	1532
2019	205,374,124	555,812,812	1532
2020	222,380,619	610,245,353	1532
2021	236,002,480	652,713,107	1532
2022	247,469,572	687,891,839	1532
2023	257,400,777	717,927,802	1532
2024	266,178,749	744,139,017	1532
2025	274,057,158	767,394,167	1532

The calculation of CDPHE's 2017 ozone inventory , and how it compares to top-down inventories and measured ambient VOC precursors was discussed in a paper presented at the 2017 EPA International Emissions Inventory Conference https://www.epa.gov/sites/production/files/2017-11/documents/evolution_of_oil_and_gas.pdf. An updated graph showing how the SIP

Inventory and the RMP Area 1 Inventories Compare to the measured VOC precursors is shown in Figure 1. The Platteville monitoring site is near the South Platte River in the Town of Platteville, Colorado in the midst of the Denver-Julesburg Basin, a primary location for oil and gas development. VOC concentrations are measured at this site between 6AM and 9AM. During this time, the air is very stable with a typical ground based temperature inversion and light drainage winds. The site thus measures VOC precursors from local sources, which are dominated by oil and gas emissions. The SIP inventory trend matches the ambient precursor trend much better than the RMP inventory trend.

Figure 1: Time Series of Emissions and Ambient VOC Precursors



These comments are regarding Section 3.2.1.3.3 Cumulative Impacts, specifically Table 3.12 of the DRMP/EIS. The paragraph preceding the table notes: "The results assume that all oil and gas is combusted, which is a conservative (highest emissions) assumption".

1. Is BLM really assuming all of the oil is being combusted too or is it just the gas being combusted? It is not typical that any of the "oil" produced would be combusted, nor would all of the gas be combusted. It would be a conservative GHG estimate to assume all of the heavy liquid hydrocarbons are combusted in addition to the gas, but BLM needs to clarify.
2. Assuming ALL of the gas was combusted as stated, there should be no residual methane (CH_4) left over. However, there is methane listed in the table. Was the gas assumed to be combusted with a 98% hydrocarbon destruction efficiency? This seems likely, but BLM needs to clarify.
3. This table is estimating GHG emissions assuming all of the gas is combusted and states that this the "highest emissions assumption" for GHG. One molecule of methane has a CO_2-equivalent of roughly 25 but combusts (completely) into just one CO2 molecule. Considering this, is the "highest emissions assumption" for GHG really reached assuming all/most of the methane is combusted? This would be the "highest emissions assumption" if BLM assumed none of the methane combusted, but that is also not realistic. BLM needs to either clarify or fix this issue.
4. Is BLM assuming complete combustion for Table 3.12? What are the BTU/scf and BTU/bbl assumptions? What emission/conversion factors is BLM using? There is no indication of how BLM is transferring from Mcf and bbl to these values of CO_2/CH_4/etc. If this is identified in another section or appendix (such as CARMMS), BLM needs to clarify.